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THIRTY YEARS OF USSR RIVER SHIPBUILDING

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Maritime shipbuilding enterprises have aided in the development of Soviet river transport. During the period of the reconstruction and the First Five-Year Plan, 17 large plants and shipyards built steel vessels for the river fleet. Among these enterprises were the Baltic Plant; Northern Shipyard; Plants imeni Marti in Odessa and in Leningrad; the Sevastopol', "Krasnoye Sormovo," and Kolonna Plants; and the Gorokhovets, Tyumen', Moscow, imeni Volodarskiy, Mordovskhinak Shipyards, as well as many other small shops.

New plants and shipyards were created during the Five-Year Plans. The Perm, Krasnoyarsk, Sretenskaya, Yaroslavl'skaya, and Gorodetsk Shipyards, and the Leningrad, imeni Molotov, Omsk, Krasnoyarsk, Nagatinskii, Samus', Bobrovskii, and Blagoveshchensk Plants began to build river vessels of steel during the Second Five-Year Plan. A number of plants building river-fleet vessels discontinued construction; however, the total number of large plants engaged in river shipbuilding increased one and a half times and reached 26. During the Third Five-Year Plan, 30 plants were engaged in building steel vessels for the river fleet, among them the Yaroslavl'skaya Shipyard and the Kherscn, Zaporozh'ye, Gomel's, and Bobrovsk Plants.

The number of new yards building wooden ships grew even more rapidly. The Zheleznyov, Pindushnaya, Sokol'skaya, Gorodetsk, Imani Gorkiy, Ost-Borovnaya, Tavda, Baturinskaya, Pridivinskaya, and Ostrovo Ship-yards and others, created during the years of Soviet power, were transformed into industrial-type enterprises. There were 29 of these in 1940 and 40 in 1947.

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All of these plants and shipyards, as well as numerous ship-repair plants and shops, have completed an extensive construction program. They have built over 1,200 tugboats and over 650 passenger vessels, 840 steel barges and 71 dredges, not counting a small auxiliary fleet and light vessels for operation during one shipping season only. As a result of this construction, the USSR river fleet has again become the largest in the world.

At the same time, the Soviet river fleet has a comparatively small number of types, among which are some of the largest and qualitatively superior river vessels. For instance, a series of powerful tugboats of the "Industrializatsiya" type, as well as a considerable number of 300- and 400-horsepower tugboats were produced.

The following table indicates the types of engineless metal vessels of Soviet construction.

| Load Capacity of Barges (in tons) | Tankers (in units) | Dry-Cargo Barges (in units) |
|--------------------------------------|-----------------------|--------------------------------|
| 12,000-12,400 | 9 | - |
| 10,000-10,400 | 14 | - |
| 8,000- 8,500 | 4 | - |
| 6,000- 6,750 | 22 | - |
| 5,000 | - | 7 |
| 3,500- 4,000 | 49 | 6 |
| 2,800- 3,400 | 7 | 40 |
| 1,400- 2,150 | 31 | 21 |
| 1,000- 1,200 | 44 | 40 |
| 650- 900 | 6 | 18 |
| 400- 600 | 29 | 66 |
| 250- 350 | 132 | 90 |
| 150- 200 | 102 | 20 |
| 100 | 24 | 58 |
| 50 | - | 11 |

During the First Five-Year Plan river shipbuilding was devoted principally to the petroleum fleet; also a special lumber fleet was built, the number of dry-cargo boats was increased, and chief attention was given to the European rivers.

The Second Five-Year Plan included the enlarging of the river fleet in outlying regions -- in the Lena, Kolyma, Central Asia, East Siberia, Far East, and Pechora River basins, where new steamship lines were organized. Fleet construction has grown considerably in the rapidly developing districts of the Ukraine, North Caucasus, Urals, and West Siberia. A fleet is being built for Dneprostroy, Balchorestroy, and the Moscow-Volga Canal, which were in need of steamers adaptable to new navigating conditions.

The utilization of shallow rivers required mass construction of special, shallow-draught, small-tonnage boats.

Industrial cargoes and local shipments acquired more importance in river transport due to industrialization. During the Second Five-Year Plan, therefore, a great number of petroleum barges were built, especially for gasoline, with corresponding tugs, special tugboats for rafts, vessels for transporting products of the automobile and tractor industry, special vessels for shipping mineral construction materials, ferries for local passenger transportation, and special refrigerator boats.

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The construction of steamships suited for navigation on the Greater Volga, that is, in rough water, was started during the Third Five-Year Plan.

Shipbuilding developed in the following main directions during the Five-Year Plans: cheaper and faster shipbuilding, vessels of lighter weight (made possible through welding and the use of metal alloys), advanced shipbuilding methods, use of local low-grade solid fuels (chiefly coal) for river vessels, modern engines and equipment, faster tugs and passenger vessels, extensive use of gas-generator vessels with increased power, introduction of mechanization for greater efficiency and convenience, and elimination of imported supplies for river shipbuilding. Significant progress was achieved in all of these fields.

During the period of the early Five-Year Plans it was necessary, due to insufficient machine building, to import large quantities of machinery and equipment. V-type steam engines, large internal-combustion engines, and engines for passenger ferries were among the items imported. At the beginning of the Third Five-Year Plan, the "Leninskay. Kuznitsa" Plant started to produce two basic V-type steam engines, 200-300 horsepower and 400-500 horsepower, with 70-85- and 160-square-meter watertube boilers. Internal-combustion engines of medium power were being manufactured at Soviet heavy machinery plants, and smaller engines for river steamers were obtained from the automobile and tractor industry and adapted for use on steamers.

River transport plants began to manufacture considerable ship-mechanical equipment during World War II. The "Teplokhod" Plant began to produce 200-horsepower vertical steam engines and 70- and 160-square meter watertube boilers, while the "Limenia" Plant produced 100-horsepower vertical engines. Other plants produced auxiliary mechanisms: pumps and reversing gears at the Gorodetsk Plant, steam-valve slides at the Shipyard imeni Volodarskiy, gas generators at the Moscow Plant, etc.

Planning and scientific organizations have aided in the development of Soviet river shipbuilding. The Central Technical Construction Bureau of the River Fleet was established in Leningrad, with branch offices in Moscow and Gor'kiy. Laboratories and experimental basins have been set up in Odessa, Leningrad, Gor'kiy, and Nikolayev.

The following results have been obtained by scientific experiments:

1. Methods of calculating ships' performance characteristics (questions of hull design, engine specifications, special devices for increasing speed, etc.) have been placed on a theoretical basis, while problems in connection with seaworthiness (stability, maneuverability, buoyancy, etc.) have been solved.
2. Calculations of the durability of metal, wooden, and reinforced-concrete river vessels have been determined on a theoretical basis.
3. Problems of the mechanical equipment of vessels; construction of engines and boilers, auxiliary equipment, gas generators, etc., have been given proper attention.
4. Special questions have been solved in connection with the activity of the River Register in regard to technical inspection of the operating river fleet and supervision of new shipbuilding.
5. Principles of classifying and standardizing vessels of the river fleet have been formulated.

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While scientific institutions carried on theoretical research, practical construction work was done at plants and shipyards, and considerable technical progress was made during the Five-Year Plans in Soviet river shipbuilding.

Although vessels built during the reconstruction period and First Five-Year Plan were pre-Revolutionary types, radical modernization of design was effected during the Second, Third, and Postwar Five-Year Plans.

The best possible hull designs for river vessels were selected on the basis of laboratory and practical experiments. The use of modern paddle wheels, variable pitch propellers, etc., resulted in considerably increased propulsion of river boats. The technical qualities of the main engines were significantly improved.

The steam pressure of engines was increased from 9-10 to 14-16 atmospheres. Superheating of steam and preheating of boiler water and air were made compulsory on new vessels. The design of internal-combustion engines was modernized and brought up to foreign standards. Specific consumption of fuel in Diesel engines was considerably lowered.

Much has been done in converting the river fleet from liquid fuel, used mainly in pre-Revolutionary times, to solid fuel: first wood then coal. Lighter and more flexible watertube boilers were used, permitting an increase of steam pressure.

Construction of a light gas-generator fleet and gas motors, to operate on wood and coal fuel, was adopted. The new construction designs permitted a lowering of building and maintenance costs.

Mechanization of labor-consuming processes continued steadily. Engine-driven freight barges and freight-passenger steamers were equipped with special loading equipment in the form of loading cranes and winches, conveyers, etc.

At present the main types of ships are using a centralized control device in the wheelhouse. A number of auxiliary mechanisms are operated electrically.

Great progress has been made in the technology of shipbuilding. Even at the end of the First Five-Year Plan electric welding was used extensively in construction work. During the Second and Third Five-Year Plans, welding was even more widely used. During the last war, modern methods of continuous production were applied in shipbuilding, at first on a small scale, and then more widely.

The over-all design of river boats has changed considerably: they are being converted from primitive forms to modern, streamlined, and elegant vessels. We may point to the ships built during the Second Five-Year Plan for the Moscow-Volga Canal (passenger and freight-passenger steamers and tugs), and also to the recent powerful 1,200-horsepower tugboats built by the "Krasnoye Sormovo" Plant for the Volga River. The newly-built liners for Moscow, Leningrad, and Kiev, and the new vessels built during the present Five-Year Plan, are even more perfect in design.

Seats or sleeping accommodations are provided for all passengers. There are dining rooms, lounges, etc., for passengers and crews. Cabins for the ship's crew, as a rule, are located on the decks, and are completely furnished and equipped. All cabins on steamers have radio

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and electricity. Ventilating, heating, and other equipment is modern. Many of the larger ships have telephones and other mechanical and electrical communication equipment.

As a result of technical progress in Soviet river shipbuilding, the new fleet has superior economical and operational qualities. Weight has been cut greatly by reducing the amount of metal used. The use of electric welding resulted in a 5-10 percent saving of metal as compared to riveted vessels of before the Revolution. Reduced weight and bulk of ships made it possible to change over from paddle wheels to screws. Forty-one percent of the vessels built during the last 30 years have screw propellers.

The cargo tonnage of river vessels has been greatly increased. The new, large, 1,200-horsepower paddle-wheel tugs exceed the best foreign-made and pre-Revolutionary types 10-15 percent in cargo capacity. The performance coefficient of river vessels is 0.42-0.43.

The more extensive use of internal-combustion engines has resulted in considerable saving (30 percent of the total number of ships were of this type). The introduction of internal-combustion engines has made it possible to create a special fleet of small shallow-draught vessels for shallow rivers.

The use of steam engines with higher pressure, watertube boilers, and more up-to-date auxiliary mechanisms has made it possible to reduce fuel consumption by 10-15 percent as compared to specific consumption of fuel in the old designs. The use of modern Diesels in place of steam engines operating on liquid fuel has resulted in a 200-300 percent reduction in fuel consumption and a 10-15 percent saving over old-type Diesels.

The considerable increase in cargo capacity of steel barges has also resulted in economy. Light barges with a load capacity up to 12,400 tons, unequalled in foreign tanker fleets, and dry-cargo metal barges with a load capacity of 5,000 tons are particularly economical.

Serial construction of single types of ships, even in prewar years, permitted up to 50 percent reduction in cost of construction. Greater cost reduction may be expected as a result of complete assimilation of modern continuous-production methods.

Note: Photographs of the ships listed below have not been reproduced, but are available in the original document at the Library of Congress: the Volga Steamship "Alabama" (this type was built from the end of the last century until the October Revolution); the Steamship "Industrializatsiya" (1,200 horsepower); the Diesel freighter "Armeniya"; a lighter for Siberian Rivers; the Diesel passenger vessel "Klim Voroshilov"; the tug "Makar Mazay"; and the local liner "Dorovin" for the Canal ineni Moskva (all built during the Five-Year Plans).

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